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SPANISH-BIOLOGY. FINAL REPORT.

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THE EFFECT ON ACHIEVEMENT OF INTEGRATING THE STUDIES OF SPANISH AND BIOLOGY WAS REPORTED. STUDENTS IN THE EXPERIMENT RECEIVED INSTRUCTION IN BIOLOGY THROUGH DISCUSSIONS AND READINGS IN SPANISH. THE SPANISH LANGUAGE THUS BECAME THE MEANS TO AN END RATHER THAN THE SOLE END ITSELF. EXPERIMENTAL MATERIALS WERE SELECTED AND DEVELOPED, CONSISTING OF FILMS, DIALOGS, TESTS, TAPES, VISUAL AIDS, A TEACHING MANUAL, AND STUDENT TEXTS. THE EXPERIMENT WAS CONDUCTED WITH ELEMENTARY AND SECONDARY STUDENTS. CONTROL GROUPS WERE USED FOR COMPARATIVE PURPOSES. EVALUATIONS OVER A PERIOD OF ABOUT 1 SEMESTER SHOWED NO SIGNIFICANT DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS IN SCHOLASTIC ACHIEVEMENT. AN UNBIASED INSTRUMENT FOR EVALUATING STUDENT ACHIEVEMENT COULD NOT BE FOUND. DIFFERENCES IN STUDENT ENTHUSIASM APPEARED TO FAVOR EXPERIMENTAL TREATMENTS. (RS)

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FINAL REPORT

Spanish-Biology

Contract No. OE-4-14-044

Project Director, Thomas A. Doran, Ph.D.

Agency, Folsom Unified School District

Date: January 1, 1965

The research reported herein was performed pursuant to a contract with the United States Office of Education, Department of Health, Education, and Welfare (under provisions of Title VI, Public Law 85-864).

HISTORICAL BACKGROUND

The present project of integrating Spanish and Biology was first conducted in the three California Tulare County High Schools (Exeter, Startmore, Redwood-Visalia) during the 1959-1960 school year. Only the group at Exeter High School carried the project through to the end of the school year. Evaluation of the program was completely subjective on the part of the teachers whose findings were:

1. Correlation of Spanish with another subject in the curriculum stimulates interest in both subjects.
2. Assures greater student motivation.
3. Encourages free expression in the target language.

Exeter High School was the only school which continued with the project after 1960, and it was in the Spring of 1963 that Mrs. Ruth Sherred, teacher of Spanish at Exeter, came to the Bureau of Secondary Education, State Department of Education to work with Dr. Thomas A. Doran, Foreign Language Consultant. The purpose of her coming was to put into useable form the materials with which she had been working. Unfortunately Mrs. Sherred after only a few days spent on the above work, died of an heart attack, and Dr. Doran was asked to bring to completion what she had outlined. (1)

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1. California Journal of Secondary Education, Vol. 35, No. 7, November, 1960, Description of the origin of the project.

PROBLEM

To determine if pupil achievement in Spanish and in Biology is improved when there exists a close relation between the study of Spanish and the study of Biology. In the original project referred to above, Mrs. Sherred wrote "that it was felt that the correlation of Spanish with Biology would stimulate interest in both subjects, would assure greater student motivation, with the result that the student would achieve more in Spanish and in Biology. The problem is to determine if there has been any such improvement.

OBJECTIVES

Generally stated our objective was to determine if pupils enrolled in a Biology class and concurrently in an experimental beginning Spanish class, in which concepts and facts of biology are made the subject of discussion, dialogue, narration, reading, etc. (i.e. where the Spanish language becomes the means to an end rather than the sole end itself), how will those pupils achievement compare:

a. In Spanish with pupils beginning courses of Spanish
b. In Biology with pupils enrolled in regular Biology courses, but not in the Biology-in-Spanish course.

I feel that it should be noted at this point that we were not attempting to teach Biology in Spanish, for it is immediately evident the absurdity of trying to teach one unknown with another unknown. Our objective therefore in the Spanish class, without resource to English, was to implant in the students mind some concept from which

could be extracted a basic biological idea by the Biology teacher.

To realize this particular objective several films with Spanish sound tracks were selected. By creating dialogues of a practical nature made up of lexical items taken from the commentary of the film, the student in learning the dialogue was soon able to comprehend the film and because of this comprehension, form ideas upon which the teacher in Biology could elaborate.

For example in the film "How Nature Protects Animals", the narrator says, "Este conejito casi el color del fondo que lo rodea, nos está haciendo muecas con la nariz".

In the dialogue the student has learned:

"Hay un animalito en aquel arbusto"

"No veo nada"

"Es dificil verlo porque es casi el color del fondo"

In the film the student has seen with what difficulty the rabbit was seen hiding in the bush. Having learned the dialogue he understands the commentator commenting about this phenomena as one of the great protective devices in nature.

From this idea first fixed by the film, then described in the language, and finally understood and repreated by the student it was presumed that the biology teacher would be able to discuss at length the great importance of <u>camouflage</u> in nature.

The purpose of the dialogues or reading units which are part of the course were to prepare the student to comprehend the Spanish sound track for the three films around which the course was organized.

It is felt that the dialogues or reading units, including the various pattern drills for each unit, constitutes what is normally considered to be a first level course in Spanish and embraces:

1. All sounds of the language
2. Patterns of most basic sentences
3. Considerable morphological changes, principally
   a. Ar, er, ir verbs in present, present perfect and preterite tenses
   b. Radical changing verbs in present tense
   c. The irregular verbs, dar, tener, venir in present tense.
4. 2000 lexical items including,
   250 verbs
   300 adjectives
   1,000 nouns
   15 prepositions
   25 adverbs
   15 conjunctions

DESCRIPTION OF MATERIALS

Since one of our purposes was to condition the student so that he would be able to understand the Spanish sound track of the films selected for the presentation of the basic concepts in Biology, we selected meaningful sentences from the sound track and put them in dialogue form. It was presumed that the student in learning the

dialogue would prepare himself for the aural comprehension of the film and at the same time would enable himself to use in practical conversation what he understood. For example the student hears the following on the sound track of the film.

"Casi todos creemos que el monte es un sitio peligroso, escarpado, obscurecido por frondosas arboles, cuyas ramas el viento sacude, haciendo crujir las hojas.

Pero no es asi. El monte es un sitio acogedor en el que habitan muchos animales. Los animales del monte corren y se esconden con rapidez, porque la gente los persigue para comer su carne o aprovechar su piel.

Sin embargo esta ardilla gris no está asustada. Con sus agudas uñas se agarra facilmente. Las ardillas bajan al suelo en busca de bellotas y de nueces que caen de los arboles. Algunas veces las entierran y despues de algun tiempo las sacan"

From the above the following dialogue was created:

Juan: -Aquí estamos en el monte

Pablo: ¡Caramba! ¡Qué lugar tan tenebroso! Estoy asustado.

Juan: No hay nada que temer.

Pablo: ¿No es el monte peligroso?

Juan: No. Es un sitio acogedor que protege los animales.

Pablo: Bueno. Juan mira ese animalito; baja del arbol.

Juan: Es una ardilla.

Pablo: Ella no está asustada. Está enterrando algo.

Juan: Tienes razon. Entierra algunas bellotas que caen de los arboles.

Pablo: Ah! Y despues de un tiempo las saca.

Juan: Sí. Le sirven para comer durante el incierno.

It was hoped that the student in learning the above dialogue would be able to understand the principal ideas expressed in the commentary of the film, namely:

1. The woods is not a dangerous place.
2. The woods is a protective place.
3. In the woods are many animals.
4. Among the animals is the squirrel.
5. The squirrel is not too frightened by man.
6. He burys the acorns.
7. The acorns are his food for the winter.

It appears evident from the above example that not all vocabulary items of the Spanish commentary could be introduced through dialogue, but simply those few which would enable the student to comprehend most of what was said. It was for this reason that after the fifth dialogue the student was introduced to reading, and short narratives which are word for word the commentary of the film, replaced the dialogues.

After each dialogue or reading we extracted some grammatical or structural item of the target language for drill work. For example in the dialogue just cited we wished to teach the student the use of the definite article and below is a sample of one of the drills.

Definite Articles

Repetition Drill

Aquí está el animal.	Aquí está el animal.
Aquí están los animales.	Aquí están los animales.
Aquí está la ardilla.	Aquí está la ardilla.
Aquí están las ardillas.	Aquí están las ardillas.

Item Substitution - put el in front

Juan, ve el monte.	Juan, ve el monte.
_____ sitio.	Juan, ve el sitio.
_____ lugar.	Juan, ve el lugar.
_____ árbol.	Juan, ve el árbol.
_____ arroyo.	Juan, ve el arroyo.
_____ cerro.	Juan, ve el cerro.
Juan, ve los montes.	Juan, ve los montes.
_____ animales.	Juan, ve los animales.
_____ árboles.	Juan, ve los árboles.
_____ arroyos.	Juan, ve los arroyos.
_____ cerros.	Juan, ve los cerros.
_____ lugares.	Juan, ve los lugares.
_____ alimentos.	Juan, ve los alimentos.
Este animal es la ardilla.	Este animal es la ardilla.
_____ nutria.	Este animal es la nutria.
_____ zorrilla.	Este animal es la zorrilla.
_____ zarigueya.	Este animal es la zarigueya.

Estos animales son las ardillas.	Estos animales son las ardillas.
_____ nutrias.	Estos animales son las nutrias.
_____ zorrillas.	Estos animales son las zorrillas.
_____ zarigueyas.	Estos animales son las zarigueyas.

Substitution Drill

El árbol está en el monte.	El árbol está en el monte.
___ animal _____ .	El animal está en el monte.
Los _____ .	Los animales están en el monte.
_____ ardilla _____ .	La ardilla está en el monte.
_____ en el árbol.	La ardilla está en el árbol.
Las _____ .	Las ardillas estan en el árbol.

TESTS

A test for each of the thirteen units was created and put on tape. Each test is intended to measure the students aural comprehension, and also his knowledge of the grammatical point or structural item we were attempting to teach in each unit.

As already mentioned, our purpose in the unit just cited was to teach the use of the indefinite article and to train the student to comprehend one of the first parts of the film's commentary. The test for this unit was composed of 24 items and divided into three parts.

Part I. A series of questions were asked for which there were appropriate answers from the dialogue. For each question asked five possible answers were

suggested, one of which was most appropriate and which the student selected by circling on the answer sheet the letter which corresponded.

For example the student hears: Esta asustado Pablo?

a. Es un sitio acogedor
b. Ve un animal
c. Se llama ardilla
d. Sí. Esta asustado
e. Entierra bellotas

He would circle "d" on his answer sheet because the fourth answer heard was most likely.

Part II. The student heard a statement or question. Four responses lettered a, b, c, d, were given from which he selected the right response by giving the correct form of the definite article.

For example the student hears. Que le gusta a Juan?

a. Le gusta la lugar
b. Le gusta el lugar
c. Le gusta las lugar
d. Le gusta los lugar

The student would circle b on his answer sheet as the correct response.

Part III. Was further testing of aural comprehension through use of directed dialogue.

For example the student heard "Diganle a Pablo que Ustedes están en el monte".

a. Estamos en el monte.

b. Juan está aqui.

c. Pablo no esta alli.

d. Pablo y Juan están alli.

e. Ustedes están en el monte.

The student would circle on his answer sheet the letter a the correct response.

It should be noted that the above test, as did the first five tests, originally consisted of sixty items. These original tests were item analyzed by Dr. Stanley Ostrom of Hughes Dynamics and from the original sixty items 24 items were selected in consideration of their discriminatory value and their percentage of difficulty. The reason for not having the other tests so analyzed was owing to the fact that Dr. Ostrom's fee of $100.00 per day plus expenses was beyond the amount alloted by the U. S. Office of Education for such service.

Comprehensive tests of a similar nature follow the fifth, ninth and thirteenth units. All of these tests are recorded on tape with a native speaker providing the vocal.

TAPES

Magnetic tapes accompany each unit. A native speaker breaks down each sentence into meaningful segments which can easily be repeated

in the pause which is provided. The technique employed on the tapes is what is more or less standard in audiolingual materials.

The tapes also include the tests which follow each unit, and the comprehensive tests after units 5, 9, and 13.

FILMS

Three reels of film enitled "Common Animals of The Woods", How Nature Protects Animals" (revised version), Gray Squirrel (original version) were used to visually present the facts from which could be extracted the basic biological concepts. For example after viewing the film "Common Animals of the Woods" such questions as the following might be put to the student.

1. Which animals in the film can be called meat eaters?
2. Which animals in the film can be called plant eaters?
3. In what way do the teeth of the two kind differ?
4. What is a rodent?
5. Which kinds live on land alone?
6. Which can live in water and on the land?
7. Do all build homes?
8. Which animals hibernate?
9. What is a marsupial?
10. What are the various defenses of the animals?

etc. etc. etc.

The three films mentioned above may be obtained from Encyclopedia Britannica Films, Inc., Wilmette, Illinois and come with both English

and Spanish sound tracks. Each film is about 15 to 20 minutes in length. The film Gray Squirrel has two editions, the original and the revised. We chose the original edition as the Spanish sound track is much superior and the voice of the commentator much more enjoyable and the Spanish more authentic.

VISUAL AIDS

In the teachers manual there are 30 pages of cue sheets suitable for the opaque projector. Each cue sheet has a series of drawings which serve as a visual stimulus for eliciting each line of the dialogue or a sentence from one of the narrations. Without reference to the graphic symbol the student is able with the help of the visual aids to give back the dialogue or express the suggested idea in the narrative.

TEACHERS' MANUAL

The teacher's manual consists of 161 pages and is divided into five sections:

1. Procedures, which outlines the manner in which the materials are to be used.
2. Tests. The tests which are on the tapes appear in written form in the teacher's handbook.
3. Comprehensive tests.
4. Biology tests in English.
5. Cue sheets as described above.

STUDENT TEXT

The student text consists of 165 pages and is divided into thirteen units or lessons. The first five units are in dialogue form followed by various types of pattern drills, with question-answer practice or directed dialogue. The remaining 8 units are identical in form but short narratives replace the dialogue.

GENERAL PROCEDURE AND RELATED RESEARCH

In September 1963 the above described materials were put to action research in grades 4 and 5 of the Cordova Lane Elementary School, Rancho Cordova, California; in grades 9 of Exeter High School, Exeter, California; and in grade 10 of Cordova Senior High School, Rancho Cordova, California.

GRADE SCHOOL

In the grade school the fourth and fifth grade classes mentioned above were taught by two distinct teachers in a self contained class room. The fourth grade teacher had little if any knowledge of Spanish. The fifth grade teacher knew considerably more Spanish, but was far from being proficient. Whatever she said however was pronounced well, and she was able to detect poor pronunciation among her pupils, and give an acceptable model of Spanish to them.

It was planned for the professional foreign language teacher to visit the 4th and 5th grade class twice a week. The teachers in those grades were suppose to follow up during the week with what had been

presented, and by oral drills reenforce such instruction.

The first dialogue which served as an introduction to the rest of the material and merely set the scene for what was to follow consisted principally in greetings and farewells which are more or less common to any beginning course in a foreign language. The students did well with this first dialogue, and after about fifteen days with a twenty minute period of instruction were able to dramatize it.

About 8 minutes of each period were given to repetition drills, person-number substitution and number substitution with the result that in most instances the students were able to use the verb "estar" in the proper form when given a subject to go with it. From the very beginning there was a marked degree of difference in performance between the fourth and fifth graders which was partly due to the fact that the fifth grade teacher performed along with the pupils at the time of the professional foreign language teacher's instruction, which was not the case with the fourth grade teacher.

After the first three weeks of instruction the first part of the film Common Animals of the Woods was shown several times until the sequence of events could be described in English and the setting for the second dialogue was given by giving English equivalents for each of the pictures on the cue sheet which pertained to each sentence of the dialogue.

Work on the dialogue together with the various drills which accompanied it continued, but in the one class there was little or no follow up by the teacher for the reason that the students were

learning more rapidly than she, and her own insecurity in the language discouraged her efforts. The fifth grade teacher continued to follow up with the instruction as planned, but seemed to find it increasingly more difficult to do so, with the result that the only consistent instruction was that given by the foreign language professional twice a week. The result was that student interest and enthusiasm began to wane as the degree of achievement became less and less and so the experiment was abandoned at the end of the semester. The main reasons for so doing were:

1. The amount of time (20 minutes per day) proved to be insufficient for this type of program.
2. The material seemed to be too difficult for the follow up by the elementary school teachers who in each instance had a very limited command of the foreign language.
3. Pupils in grade 4 and 5, although they reacted well to the film Common Animals of the Woods, found the longer sentences in the ensuing dialogues increasingly more difficult and responded poorly to the tapes prepared to help them in their pronunciation. They also resisted the pattern practice and structural drills and appeared incapable of deducing the grammatical inferences involved in such a procedure.

HIGH SCHOOL

At Cordova High School in Rancho Cordova, California, Dr. Thomas A. Doran, for the sake of the experiment volunteered to teach two

sections of beginning Spanish. It was decided that one section would be used for the experimental group and would use the materials described above, and the other section would be the controlled group and would use "Entender y Hablar" published by Holt, Rhinehart, Winston Inc.

At Exeter High School in Exeter, California, Mr. Antonio Vigil was teaching two sections of beginning Spanish. One section he designated as the experimental group and used the above described materials, and the other section he chose for the controlled group and used the ALM, Spanish Level One, published by Harcourt, Brace and World Inc.

The classes for the controlled and experimental groups in both the above mentioned High Schools were daily classes with fifty minute periods. The procedure for the experimental group was first to explain the general purposes of the course, namely

1. Understand the commentary accompanying each film.
2. To describe orally in the target language the action of each film.
3. To read passages of what they have heard and said.
4. To write sentences about what they had read or heard.

The student was especially reminded of the fact that aural comprehension was the most difficult of all the skills in language learning and that many hours of exposure to the spoken word would be required before beginning to comprehend.

Before teaching dialogues 1 through 5 the student was shown the film Common Animals of the Woods in its entirety. When asked for a

raise of hands on the part of those who understood what was said, not one hand was raised.

After the complete showing of the film the first few feet which related to dialogues 1 and 2 were shown. This part of the film was shown several times, until the student was able to describe in English the action and sequence of this particular segment. When the sequence was well established the teacher began work on the dialogue, and accompanied each meaningful phrase with the showing of a picture on the cue sheet which might elicit such an utterance. Twenty minutes each day were spent in the language laboratory where the student heard on tape the passages they had repeated various times in class, repeated over and over by a native speaker with pauses for imitation. This procedure continued until the student was able to say the whole dialogue at normal speed by merely looking at the cue sheet with the pictures identified with each sentence.

Having learned the dialogue the student was introduced to directed dialogue wherein the student was told in the target language to ask a question or make a statement. The teacher first gave the direction and then said for the student what had been directed. The command or direction was again given and the student was expected to say or ask what had been directed.

In question and answer practice the question was asked twice. The first time the question was asked the student gave a short answer. The second time the question was asked the student gave a more lengthy answer.

Monotony in the class was avoided by switching from dialogue to pattern drills related to it, directed dialogue and question and answer practice.

Beginning with unit 6 and continuing through 13 short narratives replaced the dialogues since more lexical item could be introduced and the commentary of the film more easily and fully understood. These narratives were never memorized but were simply overlearned.

It was not until the 6th Unit that the student saw the written word.

The instruction of the experimental group, as described above and with the use of the materials which were prepared, continued at Exeter for a little over one semester. About four weeks after the semester, Mr. Vigil transferred the experimental group to the use of the Level One Spanish, published by Harcourt, Brace and World Inc. The reason for this transfer was owing to the fact that Units 6-7-8-9 of the Spanish Biology has been centered around the original version of the film entitled "How Nature Protects Animals". This particular film and version had been selected by Mrs. Ruth Sherred, the originator of the project in 1959. Unfortunately this film was revised in 1960 and the original version is no longer attainable, with the result that the original narratives which had been taken from the commentary of the original version of this film were completely different from the commentary of the revised addition. Consequently units 6-7-8-9 had to be rewritten so that the narratives would be identical with the commentary of the revised edition.

Dr. Doran at Cordova High School by rewriting the narratives for units 6-7-8-9 so that they related to the commentary of the revised edition of the above mentioned film, continued the instruction of the experimental group for the whole school year with the exception of the last six weeks, at which time he introduced the experimental group to the study of "Habler y Leer", published by Holt, Rhinehart, Winston Inc., which was the material he was using with the controlled group.

ANALYSIS OF THE DATA AND FINDINGS

Be it noted that Mr. Antonio Vigil and Dr. Thomas Doran are in agreement on the following:

1. The pupils of the controlled and experimental group commenced the study of Spanish with comparatively the same degree of interest and enthusiasm. In examining the scholastic achievement record of the pupils composing the controlled and experimental group, the record showed:
    1. The pupils of the controlled group at Exeter were somewhat inferior to the Experimental group according to their record of achievement in other subject areas.
    2. The pupils of the controlled group at Cordova High School were noticeably superior to the experimental group according to their record of achievement in other subject areas.
2. As the course progressed there appeared a slight degree

of more enthusiasm on the part of the experimental group at both Exeter and Cordova High Schools. This increased enthusiasm was felt to be due to the films which formed a part of the materials being used with the experimental group. The ability of the experiemntal group to increasingly understand the commentary of the film as they proceeded from one lesson to another was a satisfying experience and a reward which helped in no small degree to motivate them in their seriousness of purpose.

3. Toward the end of the fifth dialogue,. there was some resistance on the part of a few pupils in the experimental group. This resistance arose from the fact that much of what they were learning did not lend itself to the daily situations in which they found themselves. Much of the vocabulary they were learning did not include the lexical items which immediately relate to school, home, sports, amusements, etc. This resistance grew since much of the vocabulary existing in the materials which were used in the controlled groups applied to such situations as home, school, sports, amusements, etc. This resistance was gradually overcome when it was pointed out to them that much which they were learning by simply substituting a new lexical item could be of very practical significance. For example they learned in Spanish "The squirrel eats acorns." From this simple sentence with little increase

in vocabulary and by simple substitution they were able to say Man eats fish

Man eats rabbit

Man eats meat

Man eats food

etc. etc.

Man does not eat acorns

Man does not eat bark

Man does not eat trees

In fact those pupils who were resisting, because of the above reasons, became quite reconciled when they discovered that most acts animals perform man does also, and being able to describe them was of practical value in daily conversation. For example from the film they learned that

Animals get hungry

Animals are afraid

Animals run

Animals sleep

Animals quarrel

Animals build homes

Animals have friends

Animals have enemies.

It was this discovery that everything animals do, men do also, and that what they said about animals could be affirmed or denied about man, which seemed to rekindle

their interest and bring home to them that most of the vocabulary they were learning was of high frequency in daily conversation.

4. Aural comprehension seemed greatly improved among the students of the experimental group, and they appeared to appreciate more than the controlled group the necessity of listening attentively to what was said since so many sounds were phonemic in nature. To measure the aural comprehension of the experimental group in relation to the film "Common Animals of the Woods", a tape taken from the film's sound track was played on the tape recorder. By skipping about on the tape and playing various segments which described the action of the film, it was quite gratifying to the teacher and pupil, the student's ability to identify the scenes in the film as they were triggered by some particular word or phrase. In this procedure the student heard only the sounds of the film without seeing the pictures.

5. The students in the experimental group appeared to be more realistic in what they said as a result of identifying with the film. They spoke of the action and the animals which performed it as something they had really witnessed or experienced. For example when describing in Spanish the incident of the skunk, they were quite convincing in saying:"La zorrilla es un animal que arroja un líquido

que huele muy mal."

6. We were fortunate at Cordova High School to have at our disposition, Mr. Julio Ferrer, a graduate student from Venezuela, who spoke little English. Upon the completion of each unit, Mr. Ferrer visited the classes of the controlled and experimental group, and listened to the students as they recited the dialogues or read the narratives..

In the opinion of Mr. Ferrer the students of the experimental group pronounced what they said more authentically and with greater feeling for the language than did those of the controlled group. Mr. Ferrer listened to the student without seeing him, and students were known to him simply as student No.1, Student No. 2, etc., so that his rating of the student was not biased in any way by the students performance or behaviour in class. It is interesting to note that the ratings given the student by Mr. Ferrer were practically in all cases the ratings already assigned to the student by Dr. Doran.

Mr. Vigil at Exeter also felt that the students of the experimental group pronounced better than did those of the controlled group. His evaluation in this regard was purely subjective, but to be respected as Mr. Vigil is a native speaker of the language.

The superiority of prohunciation of the experimental

group over the controlled group was felt to be due not only to the great exposure to the sound track of the film, but also to the fact that the tapes in the Spanish-Biology program break down the dialogue in much smaller fragments than do the commercially prepared tapes, so that the students in the experimental group were repeating a sentence much more often than were the students in the controlled group.

7. When the experimental group was transferred to the use of conventional materials at Exeter High School and also at Cordova High School, it was the finding of both Dr. Doran and Mr. Vigil that they progressed more rapidly than the controlled group who had been using the same material from the beginning of the year.

Mr. Vigil had two explanations for this phenomena:

1. The experimental group appeared to be a higher calibre of student.
2. The Spanish-Biology material used with the experimental group was very similar in format to the AIM material being used with the controlled group, so that the transfer was very smooth, and since what had been covered by the experimental group had been covered more thoroughly as a result of student motivation, which was enhanced by the use of films, the students of the

experimental group had a more solid foundation and were able to progress more rapidly.

Dr. Doran explained this phenomena:

1. The format of the Spanish-Biology material tends monotony, and that the variety offered in the Holt Rhinehart Material was a pleasant relief and a change in approach which delighted the student.
2. Situations such as birthdays, outings, family, etc., were somewhat more interesting than the situations in which he had been placed. The Pattern drills in the HRW material were less challenging than were the drills of the Spanish-Biology and did not necessitate the effort which had formerly been demanded of him.

8. As might be expected the controlled group could not be compared to the experimental group in the aural comprehension of the film or films. Nor could the experimental group be compared to the controlled group in the aural comprehension of the dialogues related to the materials which the controlled groups were using. This inability to compare the two was due to the difference in lexical items which made up the materials being used by the controlled and the experimental group. For example it was hardly expected that a student who had only heard and said;

"La ardilla no esta asustada", would understand and be able to say "Mi tia no esta enferma." Both sentences are identical in pattern, form, and amount of vocabulary, yet owing to the lexical items, knowing and understanding one does not make intelligible the other.

To objectively compare the progress in Spanish of the controlled and experimental group there were no objective tests available which were without bias. An attempt was considered to use the ETS Cooperative Tests, Princeton, N. J., but it became immediately apparent that such tests favored those students who were using the Holt, Rhinehart Winston Material and also the Harcourt Brace World material.

9. Only one test was given in biology. This test which was in English was intended to test the students knowledge relative to the basic biological concepts which were involved in the first film "Common Animals of the Woods." The test consisted of twenty five questions and the grading scale was as follows:

94% - 100% - A

86% - 93% - B

76% - 85% - C

70% - 75% - D

The results of the test were as follows:

Cordova High School		Exeter High School	
Experimental	Controlled	Experimental	Controlled
A - 5	A - 0	A - 5	A - 0
B - 10	B - 5	B - 8	B - 5
C - 12	C - 10	C - 7	C - 7
D - 3	D - 15	D - 0	D - 8

This test owing to the fact that there was no objective norm to which we could compare it was not of great significance. The tect by nature was biased in favor of the experimental group who had been using materials which constantly dealt with the ideas and concepts about which the test had been created.

10. Students in the experimental group who are now in their second year of Spanish are performing as well as the students of the controlled group, although they are working with material which would not be considered an ideal sequence to what they studied the first year.

CONCLUSIONS AND IMPLICATIONS

1. The study revealed that the materials prepared for the present project, owing to the nature of the science material in the films which are an integral part, are more suitable for use in grades 6-7-8. Unfortunately the films which were selected by Mrs. Ruth Sherred, originator of the project, do not deal with the biological

concepts being taught presently at the secondary level. The changes in the study of biology at the secondary level which have come about since the initiation of this project, make the present material, from the scientific view point, outmoded.

2. There appears no doubt that through the media of film, language learning is greatly stimulated and student interest increased, all of which affects favorably student achievement. In our research it became apparent that what was first presented to the student visually and described orally, by study and sufficient exposure was comprehended aurally. In time with the visual stimulus removed and only the oral stimulus remaining, the student was able to form images about what had been originally presented visually, and by drill make meaningful utterances about such images. It was by this process that basic biological ideas were transmitted upon which further biological information could be founded.

Owing to the fact that there could not be found an instrument to evaluate student achievement which could be considered unbiased, such achievement was principally a teacher's estimate, and the estimate of a disinterested native speaker who rated the group at Rancho Cordova for pronunciation, intonation, authenticity of expression, it appeared agreed that the experimental group pronounced better, had greater feeling for the language, was more realistic in what they said, than the controlled group.

3. There seem to be very few films with a Spanish sound track from which scientific concepts in biology can be extracted. This

discovery came to light when for a time it was considered replacing the films which Mrs. Sherred had selected.

4. This study brought to light the need for an instrument which will measure without bias student progress. In the ETS Cooperative Test which was so highly recommended we discovered that it was completely biased in favor of the materials being used by the controlled groups. As mentioned above and again worth noting, the evaluation of student achievement for the two groups was very subjective and according to teacher estimate.
5. In the correlation of one subject of the curriculum with another two factors must be considered:
    1. The student must be interested in both subjects.
    2. Harmonious team work between the language teacher and the teacher of the correlated subject.

One of the weaknesses of our experiment was that not all of the students in the experimental group were interested in biology. Biology students were not always able to be scheduled into the Spanish-Biology class. Another weakness was the impossibility of team work between the biology teacher owing to the difference in the biological content of the films and the biological content being studied at the secondary level.

6. The biological test in English which was administered to the controlled and the experimental group revealed that 50% of the students in the experimental group grasped at least if not more than 86% of the material over which they were being tested as compared to 20% of the controlled group.